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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,028	07/29/2003	Ge Yi	S01.12-0988/STL 11281.00	7629

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EXAMINER	
TUGBANG, ANTHONY D	

ART UNIT	PAPER NUMBER
3729	

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/629,028	YI ET AL.	
	Examiner	Art Unit	
	A. Dexter Tugbang	3729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 19-36* is/are pending in the application.

4a) Of the above claim(s) *2-6,20-23 and 25-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7,8,19,24 and 31-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 2-6, 20-23 and 25-30 continue to stand as being withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on December 15, 2005.

Response to Amendment

2. The applicant(s) response filed on June 12, 2006, has been fully considered and made of record.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. The rejections in the previous Office Action are maintained for the reasons noted below and hereby repeated merely for the applicant(s) convenience.

Claim Rejections - 35 USC § 103

5. Claims 1, 7, 8, 19, 24, 31-34 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Knapp et al 6,417,999, Tao et al 6,737,286, and Segar et al 6,368,425.

Regarding Claim(s) 1, 19 and 31, Knapp discloses a method of forming an MR sensor comprising: forming a first magnetic lead (e.g. 230 to the left of gap 241) of magnetic and electrically conductive material; forming a second magnetic lead (e.g. 230 to the right of gap

241, see Fig. 2e) of magnetic and electrically conductive material; and forming a junction (free layer 253) between the first and second magnetic leads (see Fig. 2f and 2g), the junction formed of a magnetic and electrically conductive material (col. 9, lines 1-6) and forms an electrically conductive junction core with an outer shell (e.g. outer surface area)

Knapp does not teach forming a constricted junction that includes implanting ions of a non-ferromagnetic element into the outer shell.

Tao teaches that a constricted junction can be formed by implanting ions onto an outer shell portion of the core (region between leads 70 in Fig. 9) for the purpose of substantially bridging the first and second magnetic leads (col. 10, lines 1-3).

Segar shows that magnetic leads that are formed as a junction in general, can by ion implanted with non-ferromagnetic elements of boron or chromium for the advantage of improving magnetic properties (see Fig. 4 and col. 5, lines 35-56).

NOTE: With respect to the limitations of "reducing the magnetic and electrical conductivity of an outer shell portion of the junction" (lines 10-11 of Claim 1 with similar limitations in each of Claims 19 and 32), these limitations are inherently met by Tao and Segar to the extent that the Segar utilizes the very same material (e.g. boron or chromium) as the applicant(s) and Tao utilizes other non-ferromagnetic elemental materials, both of which would achieve the properties of reducing the magnetic and electrical conductivity of an outer shell portion of the junction.

Regarding Claim(s) 34, Knapp shows the first magnetic lead, the second magnetic lead and the junction (in Fig. 2g) to be coplanar.

Regarding Claim(s) 36, Knapp further shows (in Fig. 2g) a length (e.g. distance between leads 20, 224 at the bottom of gap 241) of the junction core to be less than an average unrestricted magnetic domain wall width (distance between leads 230 at the top of gap 241) of the magnetic material of the junction core.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Knapp by including the ion planting process of both Tao and Segar, for the associated advantages of improving magnetic properties and bridging the first and second magnetic leads in manufacturing the MR sensor.

6. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art above as applied to claim 31 above, and further in view of Mao et al 6,411,478.

Knapp, as modified by Tao and Segar, discloses the claimed manufacturing method as relied upon above. The modified Knapp method does not teach that the first and second magnetic leads and the junction can be formed of a single layer of magnetic and electrically conductive material.

Mao teaches that a first magnetic lead (e.g. 325), a second magnetic lead (e.g. 326) and a junction (e.g. 330) can be formed as a single layer of magnetic and electrically conductive material within the same plane (e.g. Fig. 3 plane defined by 315, 320) to produce an art recognized equivalent MR sensor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of the prior art by forming the first magnetic lead, second magnetic lead and junction as a single layer, as taught by Mao, to positively product an art recognized equivalent MR sensor.

Response to Arguments

7. The applicant(s) arguments filed on June 12, 2006 have been fully considered, but have not been deemed to be found as persuasive.

The applicant(s) believe that the prior art above, fails to disclose all of the limitations of the claimed invention when combined and also provide no such motivation to even be combined.

The examiner most respectfully disagrees for the following reasons.

The applicant(s) urge that the secondary references of Tao et al and Segar et al are completely unrelated to the primary reference of Knapp et al as Knapp is directed to making a magnetoresistive sensor. It is well worth noting that Knapp is directed to making a magnetoresistive sensor, which is more specific type of magnetic recording head.

So in regards to the merits of Tao, the applicant(s) say that Tao is only related only to atomic scale contacts and gaps and is unrelated to Knapp in making magnetoresistive sensors. However, the examiner notes that Tao is directed related to magnetoresistive sensors and even explicitly mentions magnetoresistive sensors (see col. 1, lines 31-33). Tao forms magnetoresistive sensors on a small scale, e.g. atomic scale, and teaches the concept of implanting ions of a non-ferromagnetic element onto an outer shell portion of the core (region between leads 70 in Fig. 9). Tao suggests that these leads (e.g. 70) can be formed alternatively of a magnetic and electrically conductive material (e.g. an alloy that includes Fe, col. 9, lines 56-64) when specifically making magnetoresistive sensors. Moreover, the leads (e.g. 70) are structurally equivalent to the leads (e.g. 220) of Knapp as both Tao and Knapp share the common manufacturing problem of forming a constricted junction between leads of magnetic and electrically conductive materials. The difference being that Tao performs ion implantation of the

constricted junction, or constriction junction material (i.e. non-ferromagnetic element), as this difference of ion implantation is clearly obvious because Tao and Knapp both form constricted junctions between electrically conductive and magnetic leads.

In regards to the merits of Segar et al, the examiner notes that Segar is related as to the ion implantation of magnetic heads. All three references, Knapp et al, Tao et al, and Segar et al, manufacture magnetic heads. Tao and Segar were relied upon for their ion implantation, each having their associated advantages. The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation came expressively from the prior art themselves, i.e. Tao (at col. 10, lines 1-3) and Segar (at col. 5, lines 35-36).

Regarding the inherency argument, the examiner has carefully read the claims in light of the specification. So in reviewing the limitations of "reducing...of the junction" (lines 10-11 of Claim 1 with similar limitations in each of Claims 19 and 32), one must look to the specification to see what this would mean. The applicant(s) specification states:

> "The non-constricted junction is formed into the constricted junction 160 through implantation of ions therein, which transforms a shell portion 166 of the magnetic and electrically conductive material into a material having reduced magnetic and electrical conductivity" (page 6, lines 4-7).

Since the specification recites no other way of reducing the magnetic and electrical conductivity of the outer shell portion of the junction, this would mean that this can *only* occur

through ion implantation. Since both Tao and Segar teach ion implantation, particularly that Segar uses the very same materials of ion implantation as the applicant(s), e.g. boron or chromium, then Tao et al and Segar et al would *inherently* reduce the magnetic and electrical conductivity of the outer shell portion of the junction.

And finally, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Moreover, the applicant(s) appear to be mischaracterizing the references of Tao et al and Segar et al by reviewing certain portions of the references only and not considering each as a whole, particularly to the relevant field of manufacturing magnetic recording heads.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 571-272-4570. The examiner can normally be reached on Monday - Friday 7:30 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 571-272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A. Dexter Tugbang
Primary Examiner
Art Unit 3729

September 14, 2006